Utility MACT Working Group

Hg: Accounting for Variation/Error

OAQPS/ESD

July 9, 2002

Data

- 80 plants
- 3 runs
- 240 data points

Analysis

- Used SAS VARCOMP (Variance Component) procedure
- Analyzed the following model

$$Y_{ij} = \mu + F_i + P_j + e_{ijk}$$

$$Y_{ij} = \mu + F_i + P_j + e_{ijk}$$

- Where
  - Y_{ij} is the observation for the *jth* plant using the *ith* fuel for the *kth* run
  - μ is the overall mean,
  - F is a fixed effect for the fuel type (e.g. lignite)
  - P is a random effect due to a plant,
  - e is an error term with all remaining sources of variation

R e s u l t s

- Variance component due to plants
  - 45.94
- Variance component due to error
  - 13.29

Application

- Variance due to plant for a 3-run mean
  - 19.74
- Variance due to error for a 3-run mean
  - 4.44
- T-values for 90, 95, and 99 percent, one-tailed confidence interval
  - 1.2816
  - 1.645
  - 3.323

Application (cont.)

- Mean of best 12% for each fuel type
  - Bituminous 0.087
  - Sub-bituminous 0.724
  - Lignite 2.251

Application (cont.)

- Limit will be a one-sided confidence interval of the means of the best 12% percent for each fuel type

$$Limit = \overline{X}_{best\ 12\%\ for\ fuel} + T_{\alpha, df > 30} \bullet S$$

$$S = \sqrt{S_{plant}^2 + S_{error}^2}$$

Application (cont.)

- Resulting potential floor levels that incorporate variability (lb/TBtu)

Fuel	90% limit	95% limit	99% limit
Bituminous	5.782	7.397	10.409
Sub-bituminous	6.419	8.034	11.046
Lignite	7.946	9.561	12.573